



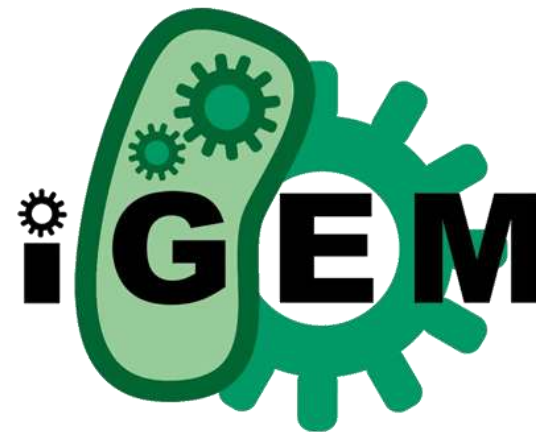
TU/e

Technische Universiteit
Eindhoven
University of Technology

Where innovation starts

iGEM

- International Genetically Engineered Machine competition

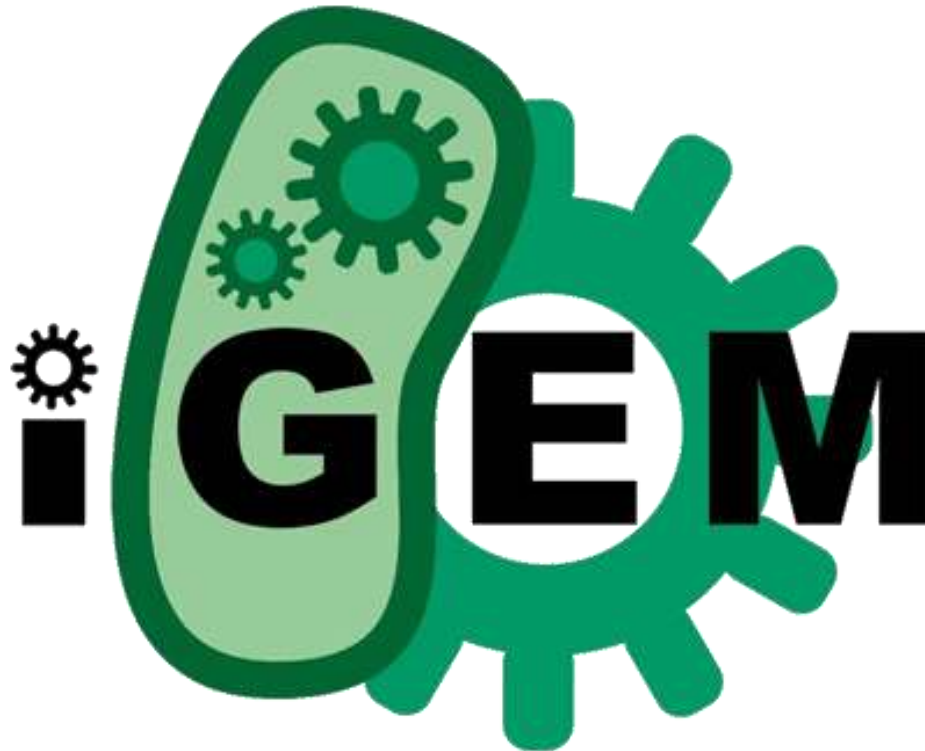


- Competition for student in synthetic biology



Aim of iGEM competition

To build biological systems and
to operate them in living cells



Aim of iGEM competition

- “BioBricks”



Aim of iGEM competition

- **Playing with BioBricks**



Aim of iGEM competition

- (Future) Engineers design systems with BioBricks



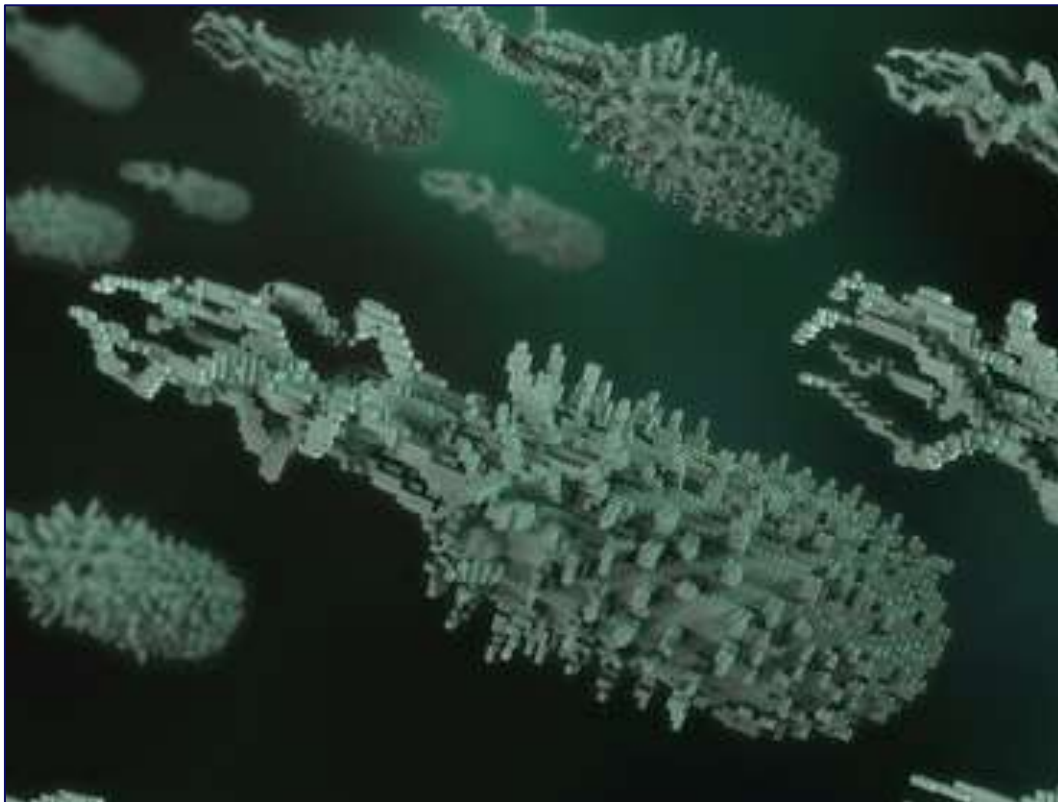
Aim of iGEM competition

- **Result**



Aim of iGEM competition

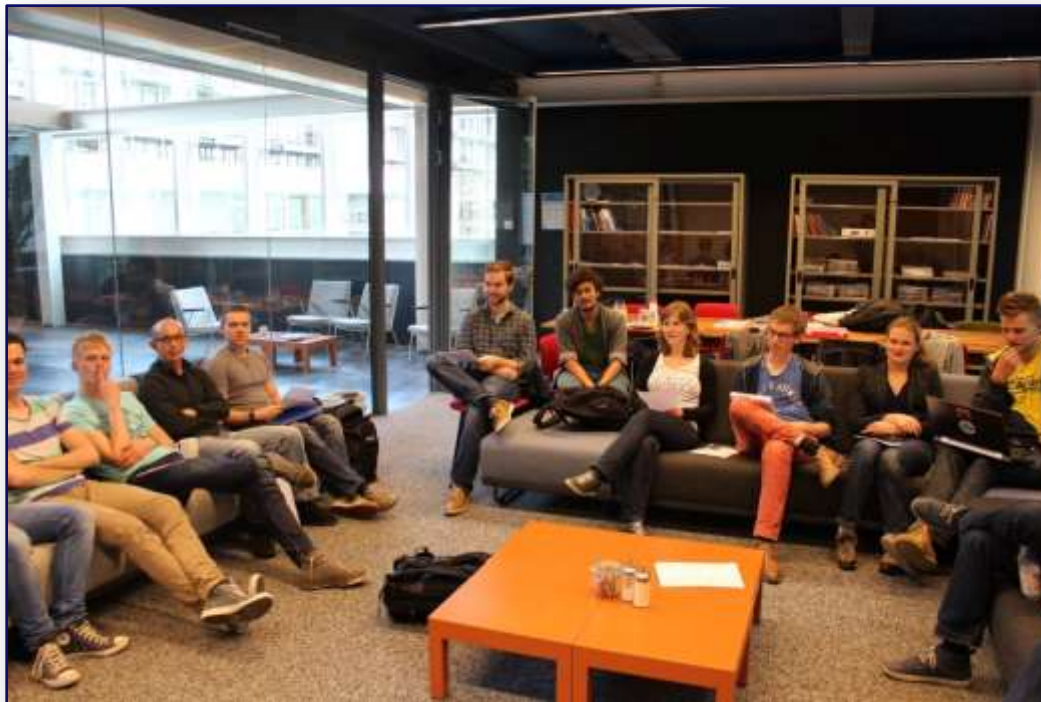
- Result in practice



iGEM in practice

January – June:

- **Brainstorm sessions**
- **Ordering materials, planning and working out details**



iGEM in practice



iGEM in practice



Summer 2014

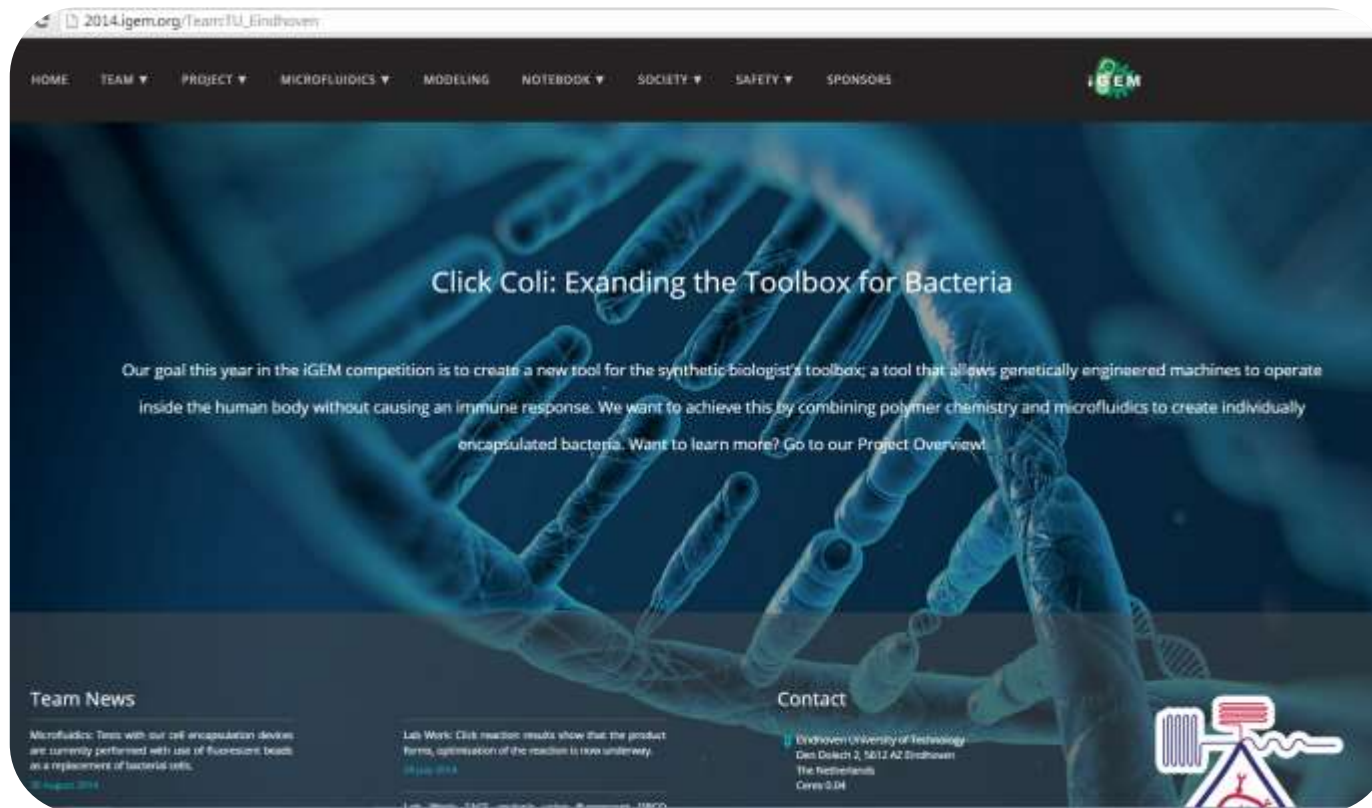
- **Let's start with the Lab labour!**



iGEM in practice

- Results available online

http://2014.igem.org/Team:TU_Eindhoven



Giant Jamboree

- 30th of October – 3rd of November
- Boston, United States of America



G I A N T 20
J A M B O R E E 14

October 30 - November 03
Hynes Convention Center
Boston, MA

The Synthetic Biology event of the year!

With over 2,500 Synthetic Biology researchers from 245 universities across 32 countries in attendance, the Giant Jamboree is sure to be the largest gathering of synthetic biologists to date. The Giant Jamboree celebrates university students as they showcase their achievements in Synthetic Biology at the iGEM Synthetic Biology competition.

Giant Jamboree

- 5 days
- 245 teams
- 2500+ participants



Tracks



Track: new application

- New application



New Application

New Application is an apt description for a track that doesn't have a common problem, or focus tying all projects together. It is the novelty of ideas and approach in investigating a question that may never have previously been examined that qualifies a project in the New Application track.

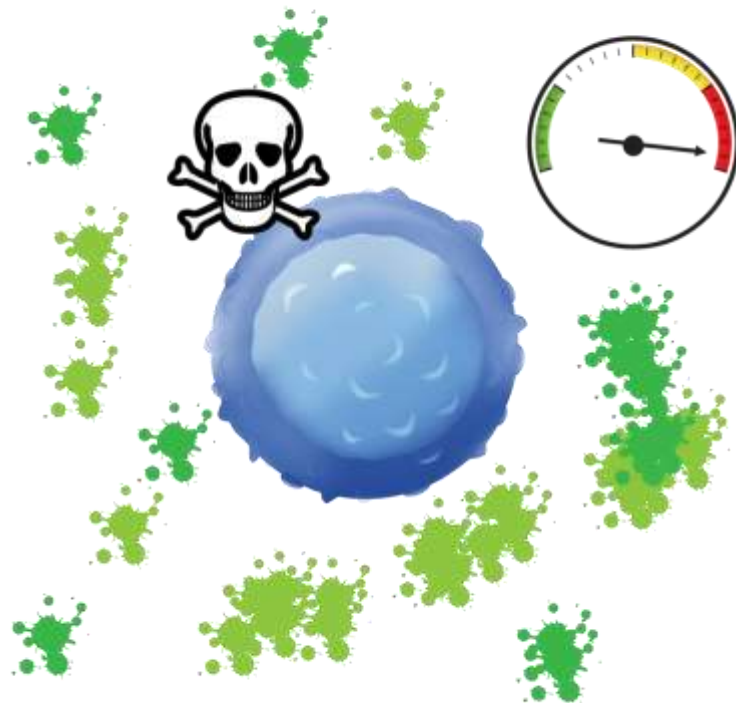
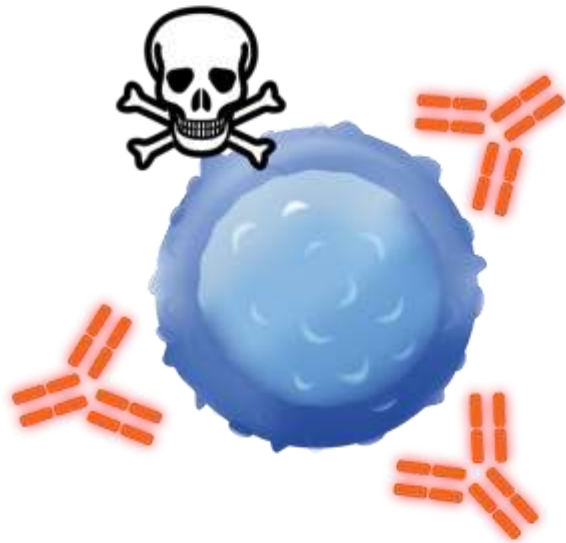


iGEM projects previous year

- **BactoBlood** **alternative for red blood cell**
- **Shining Sanctifier** **watercleansing**
- **MRiGEM** **contrast agent MRI**
- **Bee. Coli** **Save the bees!**
- **Taxi.Coli** **smart drug delivery**
- **Cardiobiotics** **cardiovascular problems**



Problem



Solution

Click Coli:

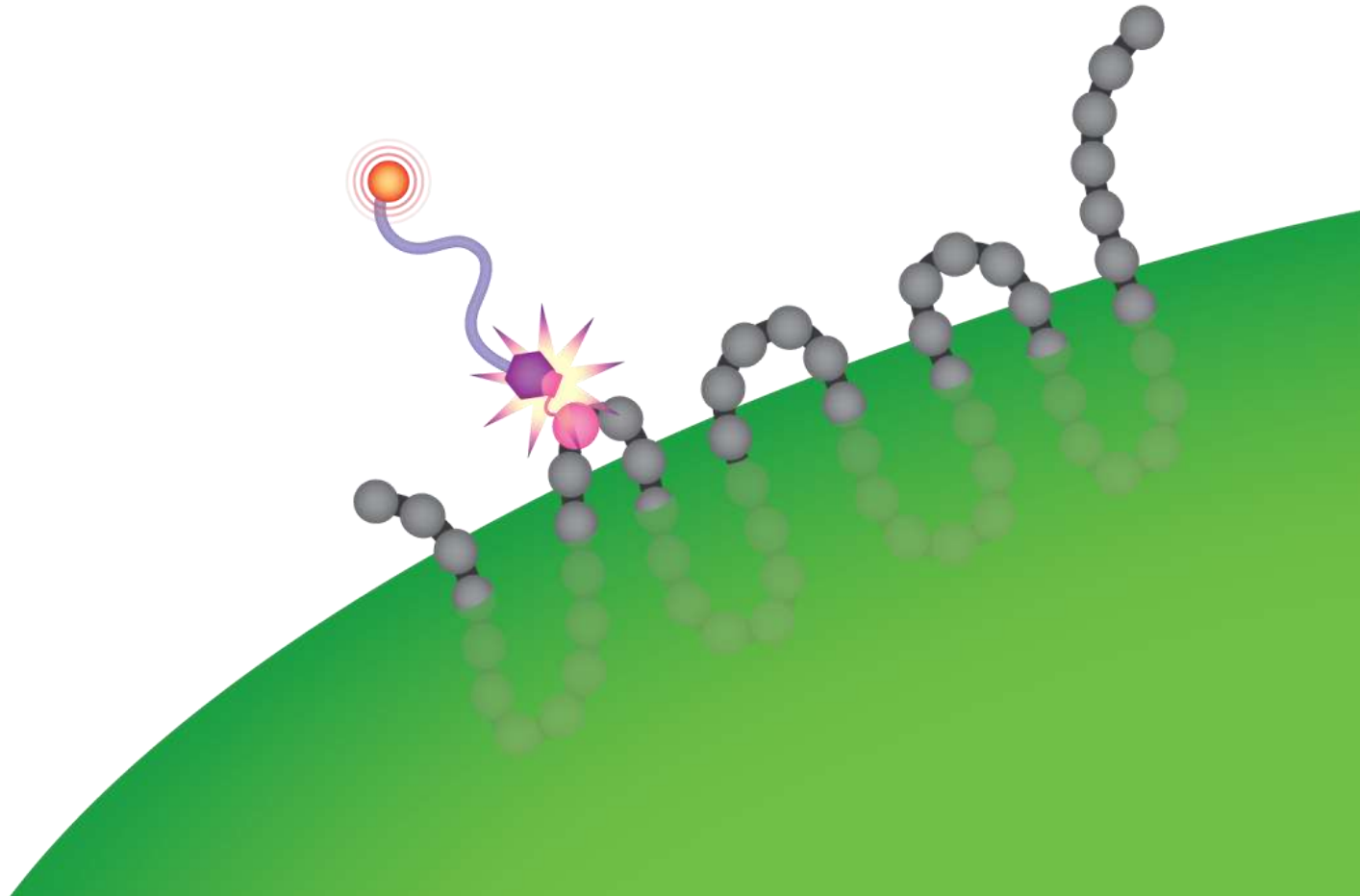
- *E. Coli* bacteria on which every chemicals group can be “clicked”
- Possible to make a protective coating around bacteria



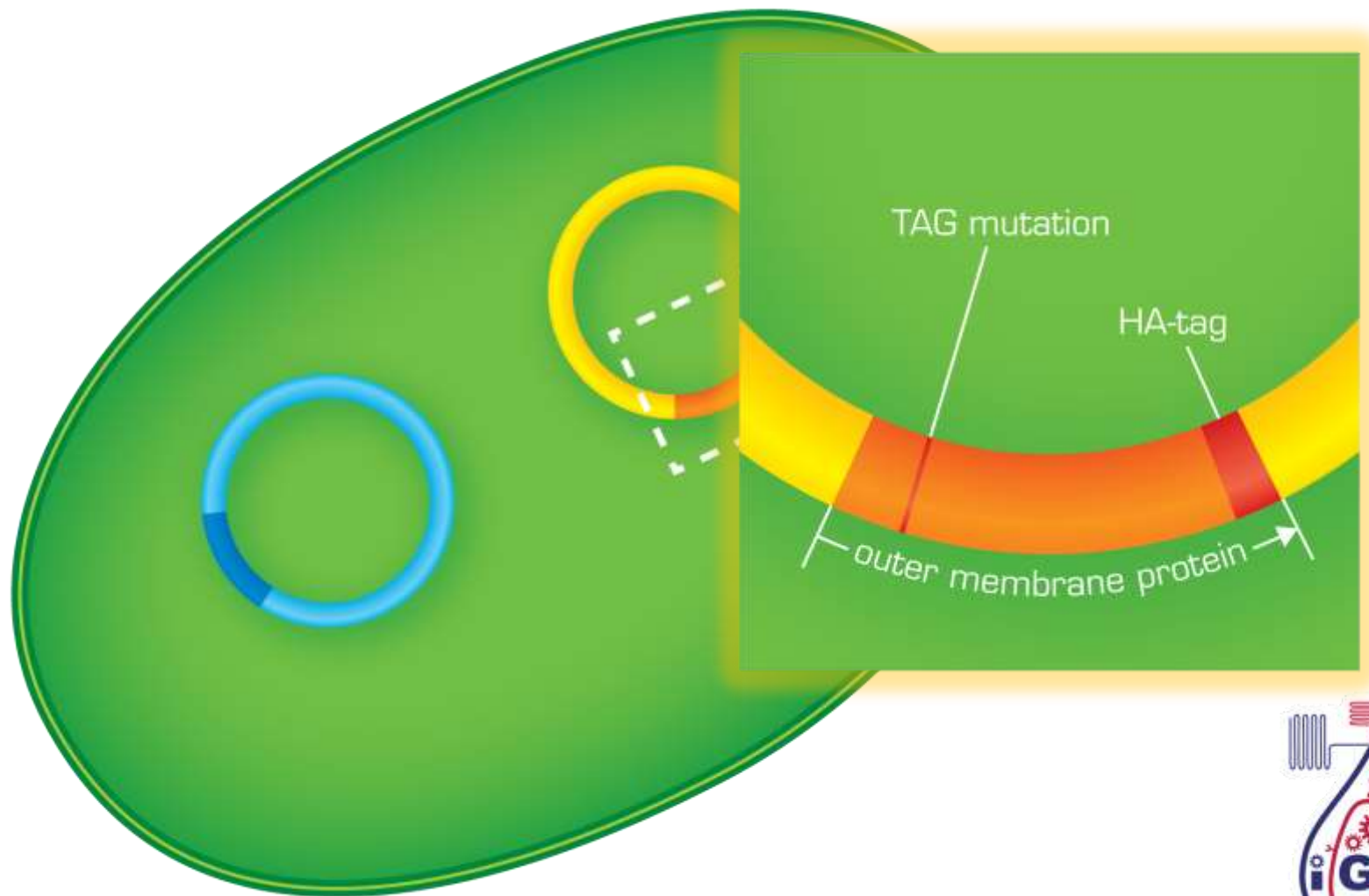
- Expansion of the chemical toolbox of synthetic biology



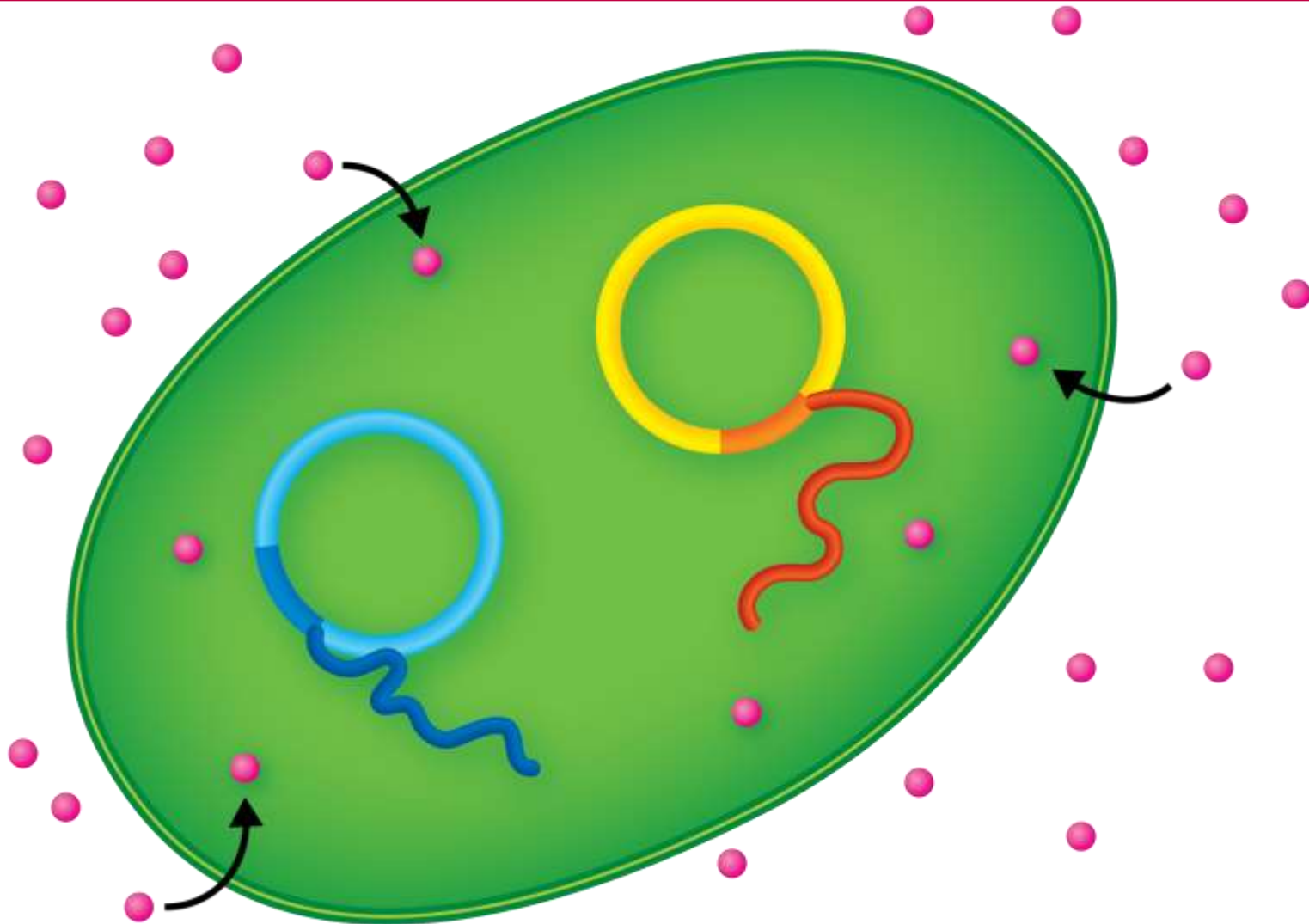
Clickable Outer Membrane Protein



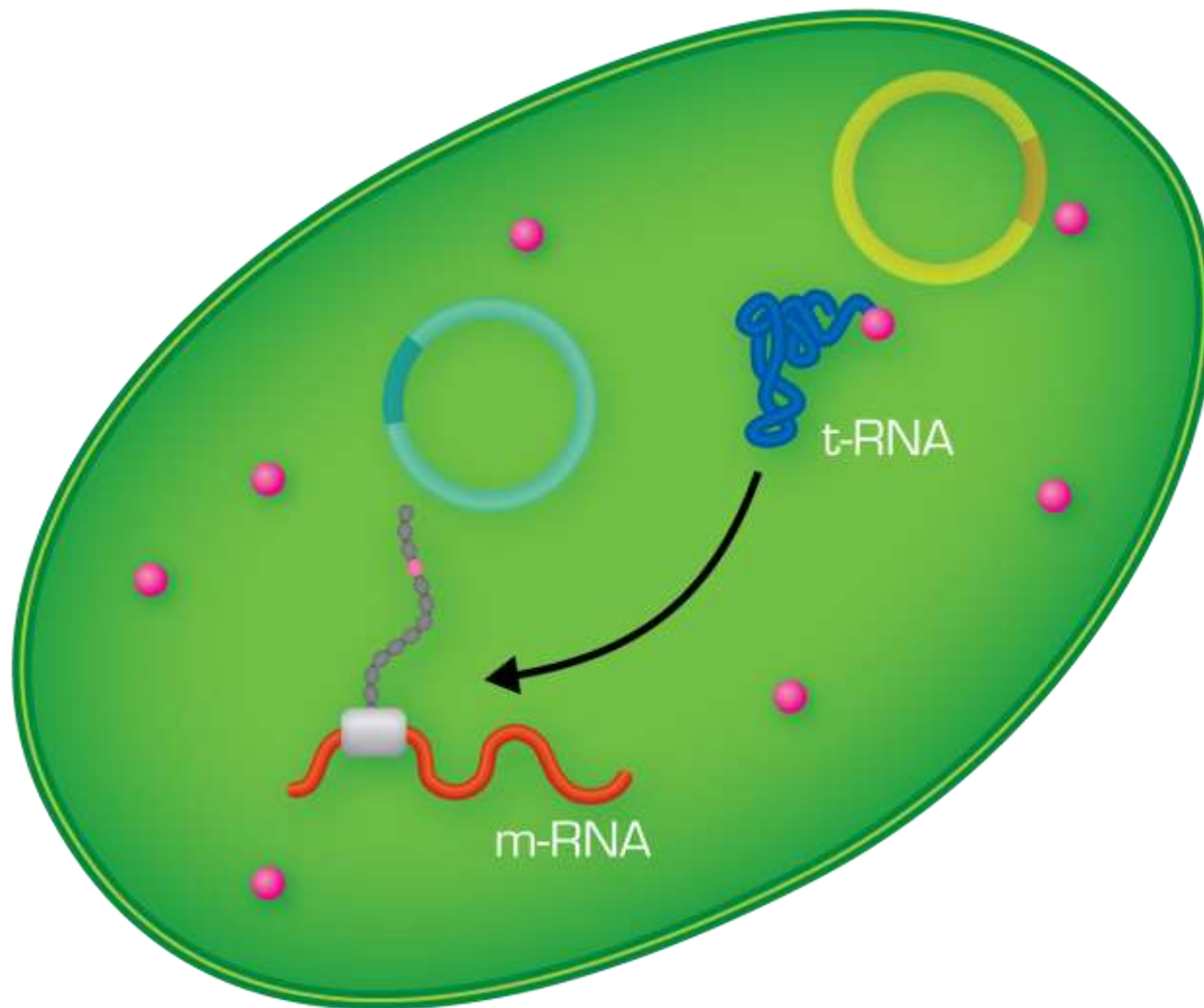
Genetische Modification



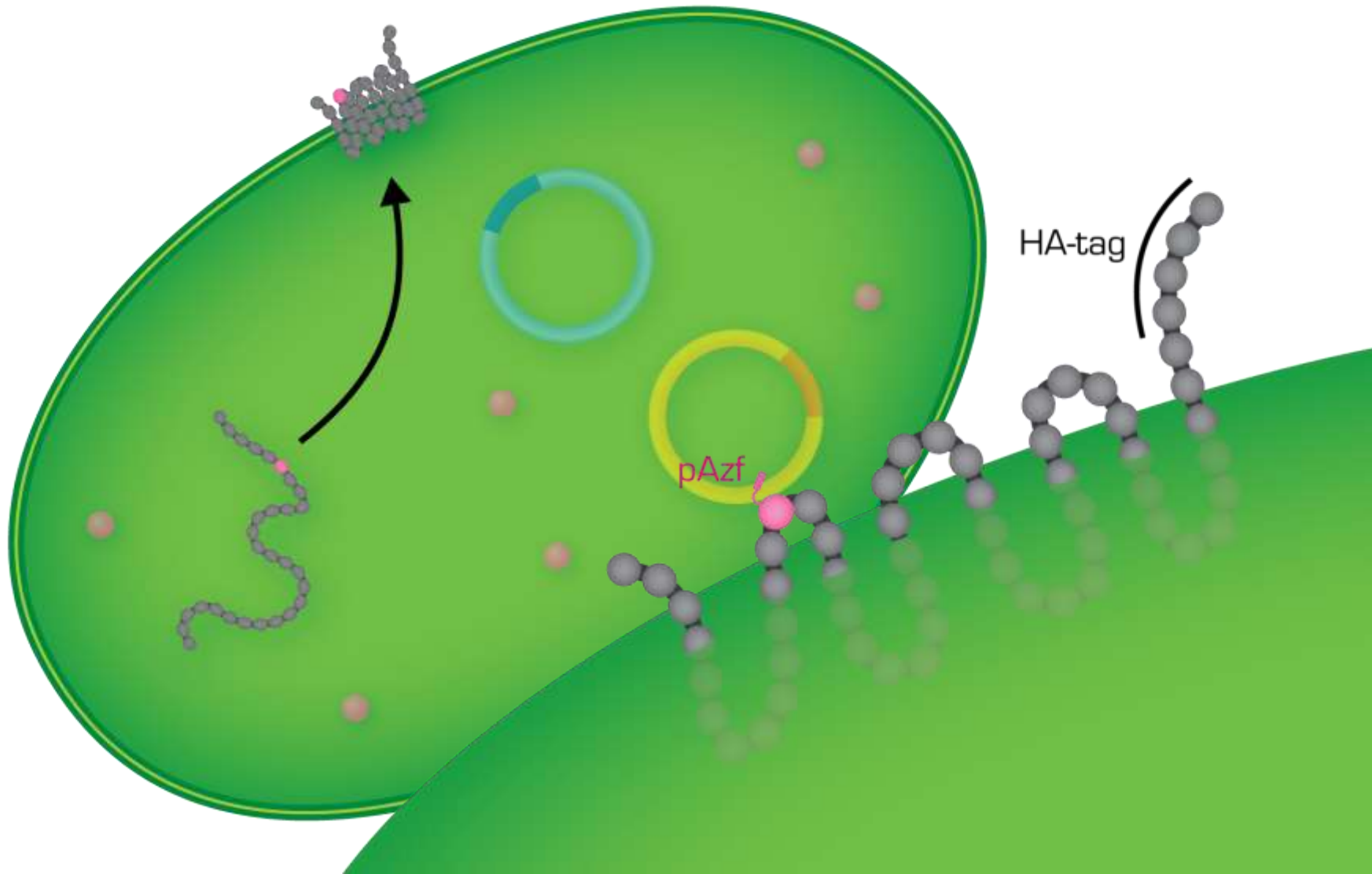
Addition of unnatural amino acid



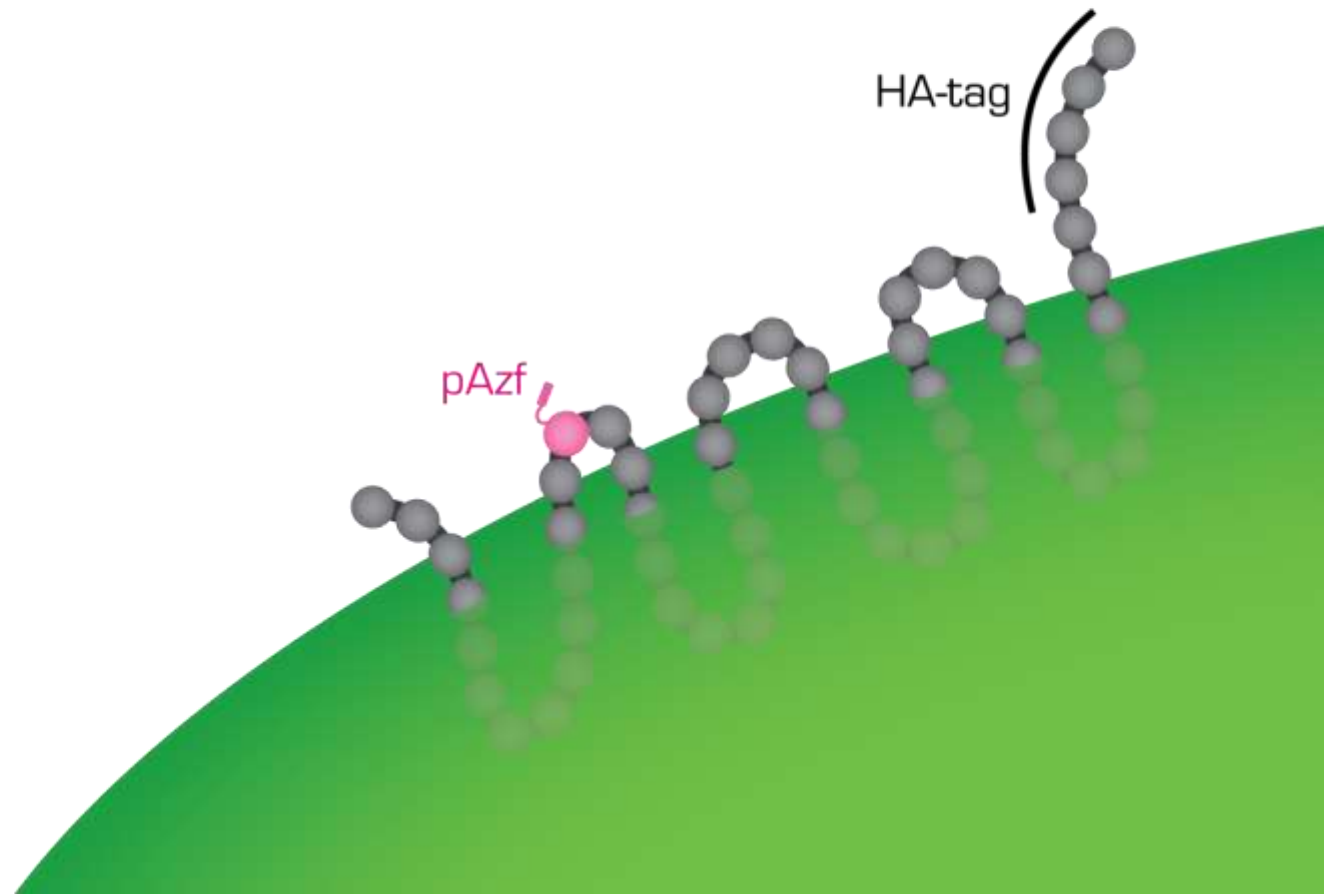
Translation



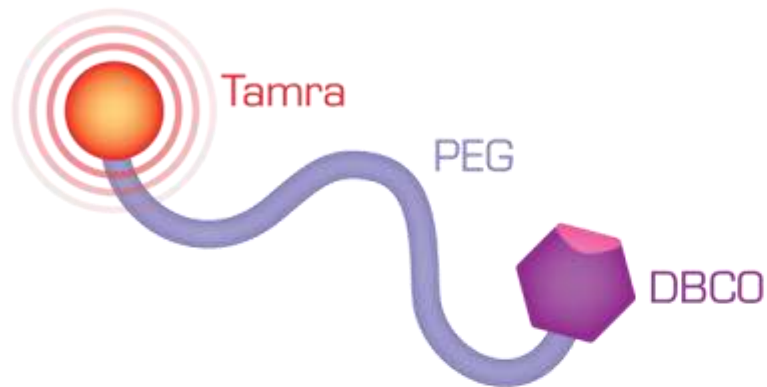
Transport to outer membrane



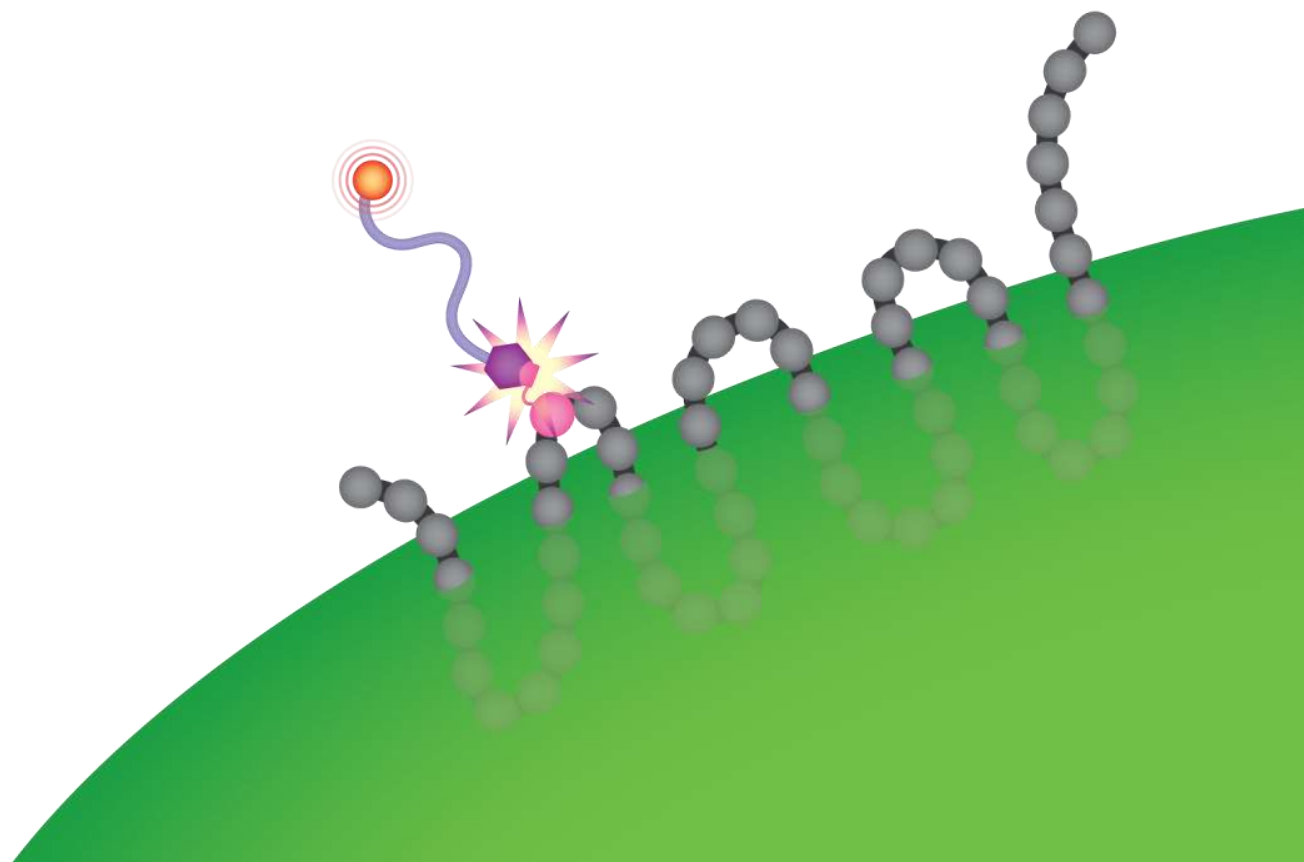
Clickable Outermembrane Protein



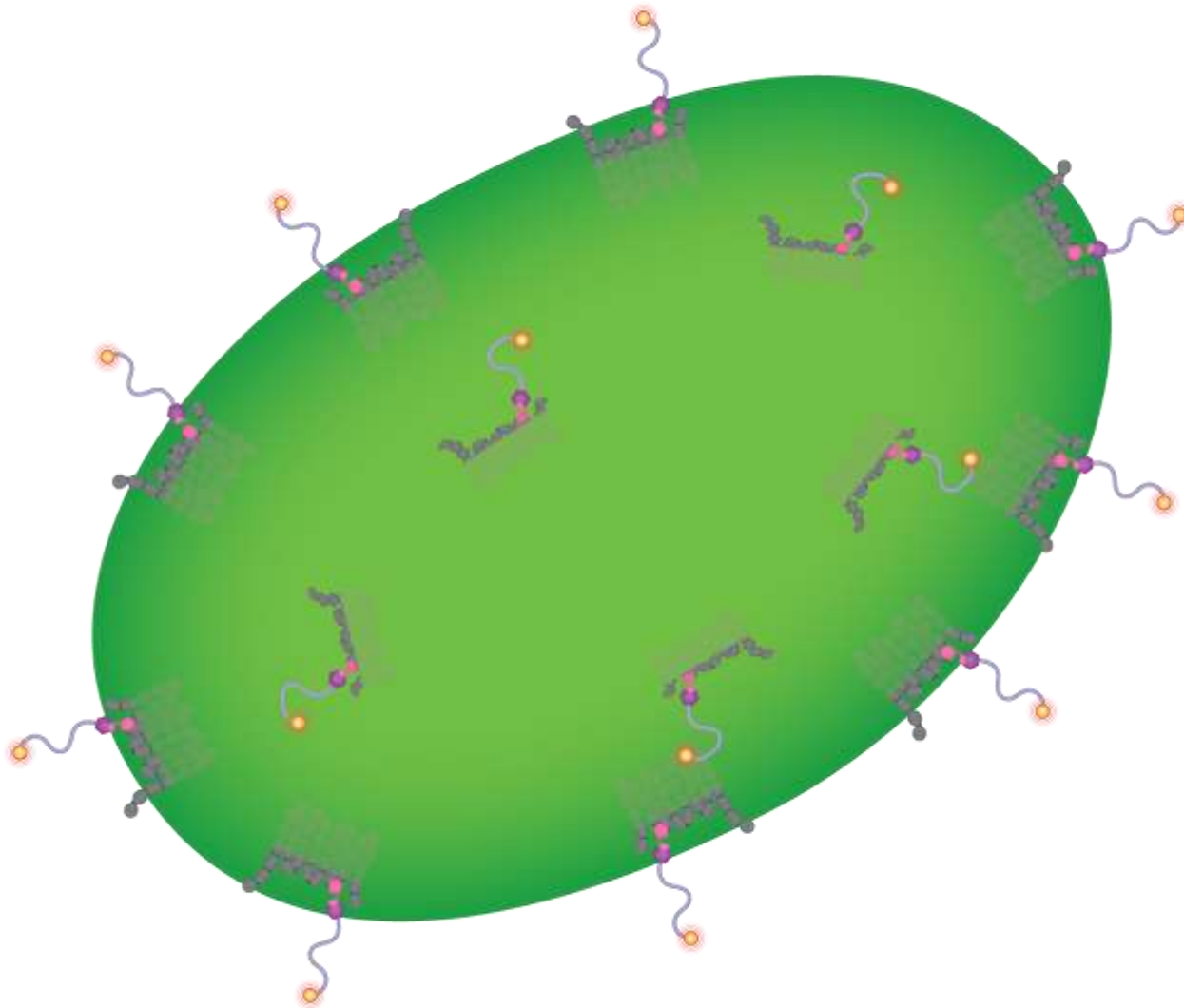
Addition of clickable chemical



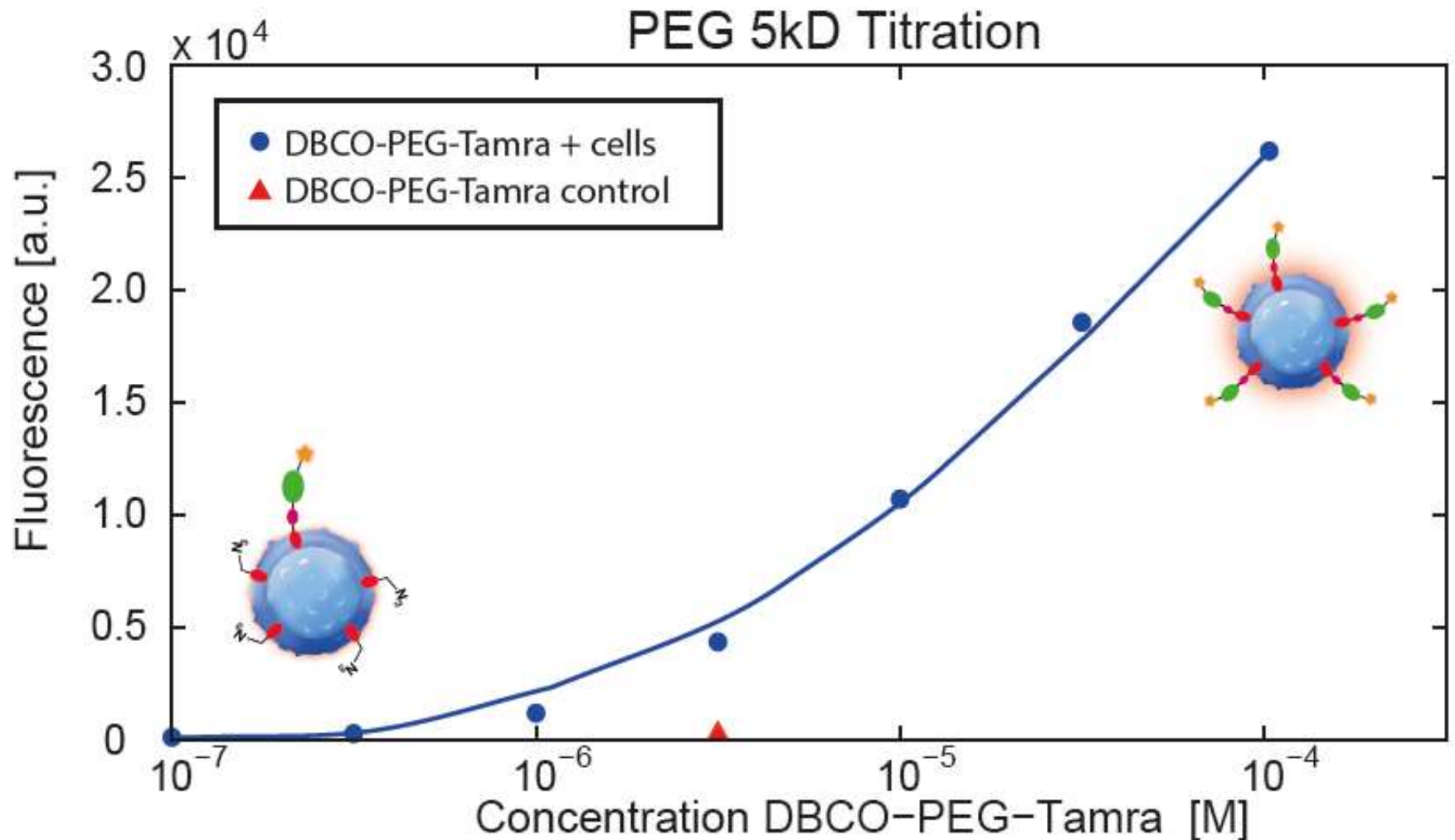
Click!



Result

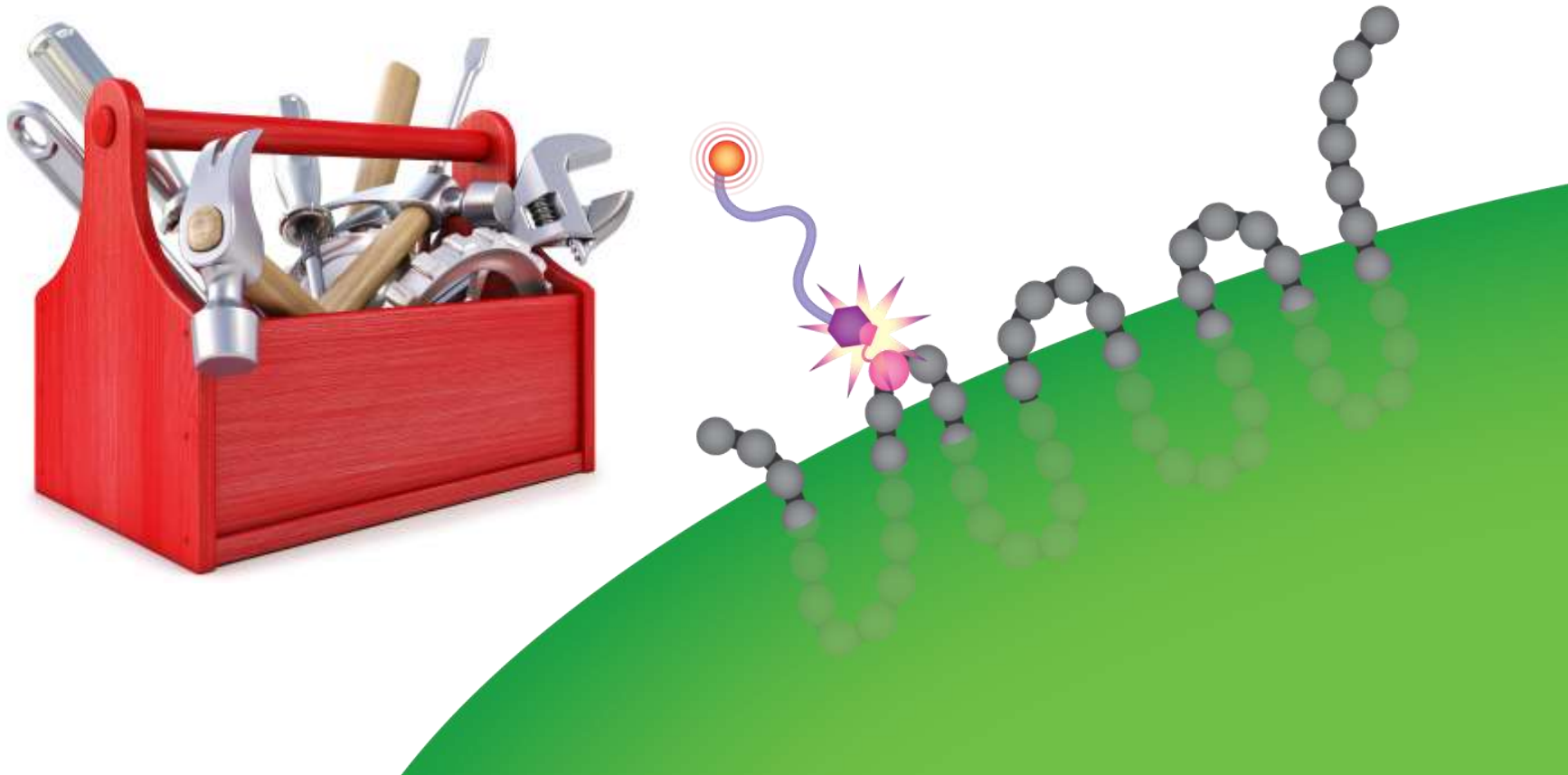


Using FACS to determine level of fluorescence



Click system

- Every desirable chemical compound can be clicked onto the membrane of the bacteria by use of the Clickable Outer Membrane Proteins



So of what use is this click system?

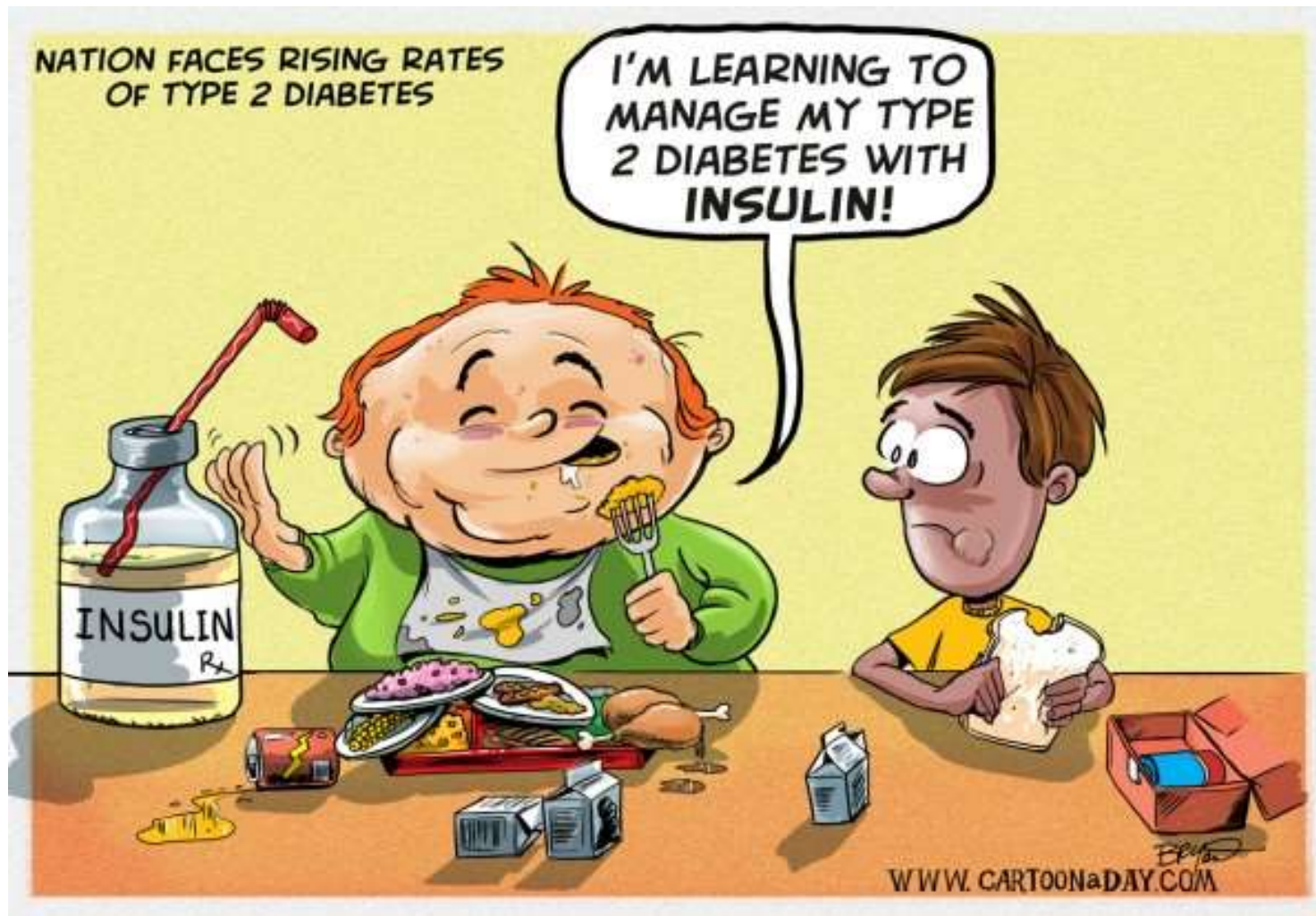
- **Application depends on the properties of the molecule that is clicked onto the bacteria**
- **Immobilisation of cells**
- **Clustering of cells**
- **Clicking proteins onto cells**
- **And so on..**



Scenario: oil spill

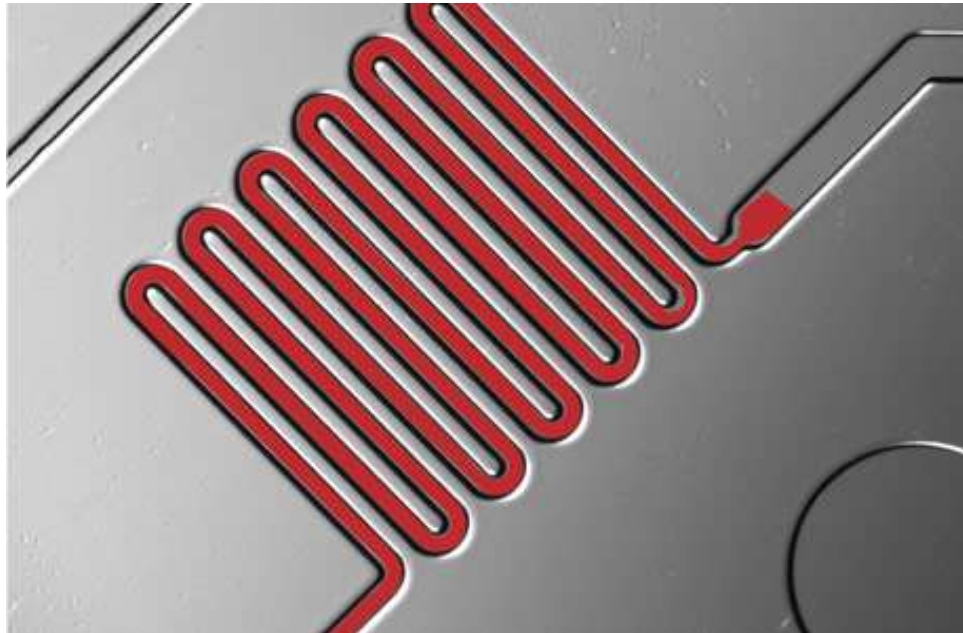


Scenario: immune system



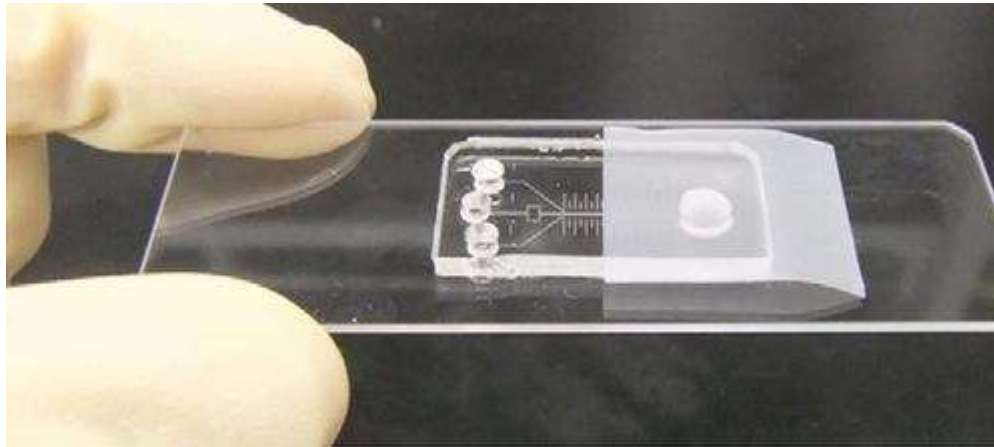
Application of Click System

- Microfluidics
- Optimised “workbench”



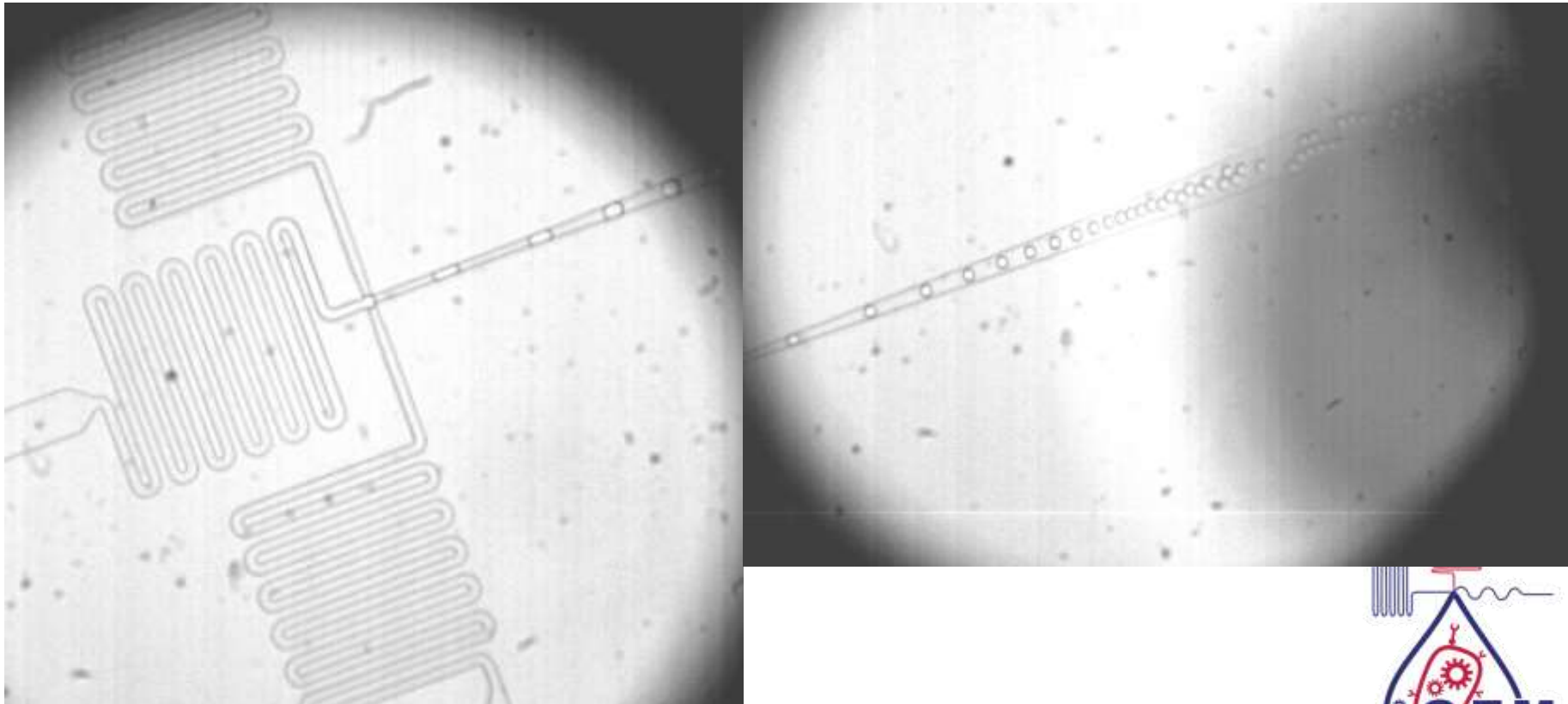
What is microfluidics?

- Lab-on-chip technology
- Scale: mm-cm



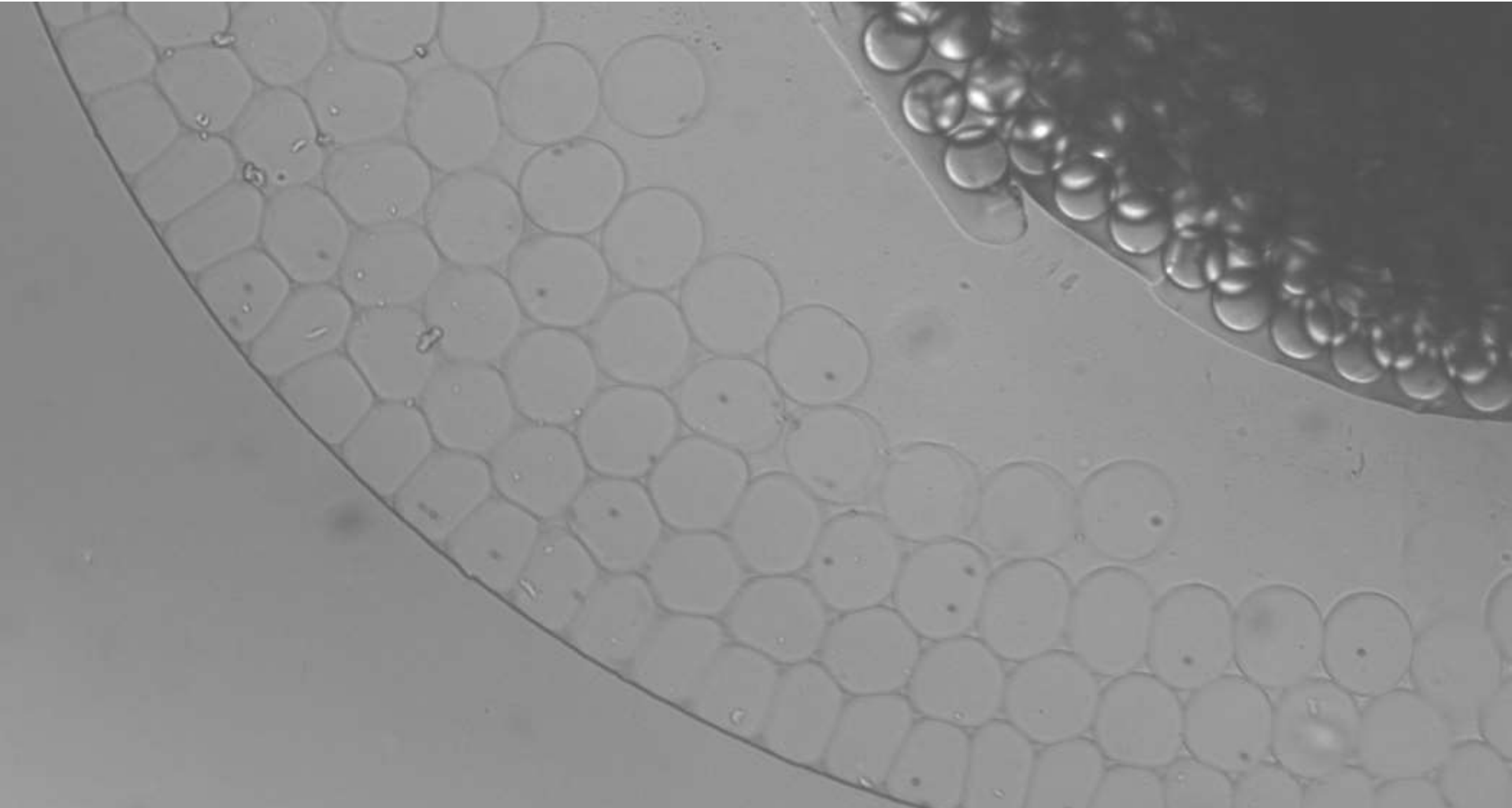
Application of microfluidics

- **Formation of microdrops (water in oil)**



Application of microfluidics

- **Encapsulation of cells**



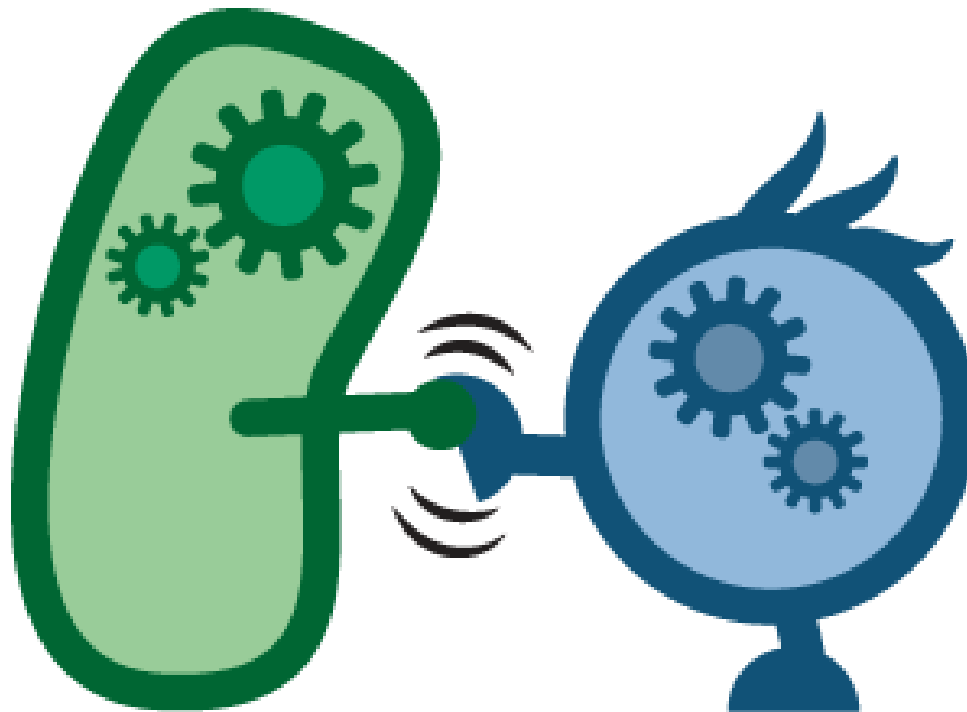
Advantages microfluidics

- Precision: one bacteria per droplet
- No clustering of cells
- Environment is well controllable
- Precision in the addition of the amount of chemicals



Human Practices

- Being open and transparent about synthetic biology
- Opportunities and risks



Children's book



Bacteria



Genetically Modified Organism (GMO)



iGEM TU/e



We would like to thank...

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Eindhoven
University of Technology

**Institute for Complex
Molecular Systems**

**Universiteitsfonds
Eindhoven**

 **GenScript**
Make Research Easy



SnapGene®
Software for molecular biology

 **Jena Bioscience**



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VETERINAIRE FARMACIA

MERIAL
A SANOFI COMPANY



... and you of course!



On behalf of the iGEM team TU Eindhoven 2014

